SRNL

Savannah River National Laboratory News

We Put Science To Work ™ Volume 1, No. 1, January 2005

News from the Savannah River National Laboratory

Secretary of Energy Spencer Abraham congratulates S.C. Governor Mark Sanford on the laboratory's designation as the nation's 12th national lab.

Welcome to the first issue!

Welcome to the first issue of Savannah River National Laboratory News. This monthly newsletter is designed to keep retirees and other interested community members informed about the exciting work taking place at the nation's premier applied research and development laboratory.

Of course, the biggest news occurred last spring — May 2004, in fact — when the Secretary of Energy formally designated us Savannah River National Laboratory, one of only 12 such national labs in the nation!

Since then, we have … well, we've continued doing what we have done for over 50 years. We have been putting science to work to meet important national needs in three areas: National security, energy security and environmental science & technology.

Each month, we'll fill you in on what we're doing in each of these areas, and what SRNL employees have been up to. We hope you find it interesting and informative.

Chuck Hunter was one of the SRNL experts providing atmospheric modeling to guide emergency response efforts in nearby Graniteville.

SRNL Atmospheric Technologies Group Plays Important Role in Graniteville Emergency Response

At 2:45 a.m. Thursday, January 6, the unimaginable and horrible happened. Two Norfolk Southern freight trains collided in Graniteville, S.C., spilling chlorine, cresol, and sodium hydroxide in the area. The chlorine release caused the greatest airborne concern due to the high volatility and toxicity of the vapors. Hundreds of public safety officials and local emergency responders flocked to the area to assist.

The experts in SRNL's Atmospheric Technologies Group (ATG) also stepped up to put their unique skills to work to help in this emergency.

ATG personnel quickly responded to monitor the situation and provide consequence assessments to the SRS Emergency Operations Center, Aiken County emergency managers, and S.C. Department of Health and Environmental Control (DHEC). In the Atmospheric Technologies Center, the group applied their skills to provide advanced modeling of the release and specialized weather support.

In the event of a chemical release, atmospheric modeling to predict downwind transport and concentration is critical to aid decision makers in determining whether downwind locations are safe. Chlorine is commonly shipped by rail as a pressurized liquid. If it is released to the atmosphere, as happened in Graniteville, the chlorine rapidly vaporizes and forms a cold, dense cloud. At night, under stable atmospheric

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2004 — A Great and Historic Year for the Lab

This was the end-of-the-year message that SRNL Director Dr. G. Todd Wright sent to SRNL employees. We're reprinting it here as a summary of the year's highlights.

This year has been significant in many ways, but the high point of the year was, of course, the announcement in May that — after decades of service to the nation — we have gained our national laboratory status. It's a tribute to all our employees, and to all of the researchers, technicians and support staff that came before, that the role we play in supporting vital national priorities has been recognized and validated this way. This is significant also because it sets a new direction for the Laboratory that will enable us to focus on national issues in our key research emphasis areas.

That was the high point, but by no means the only bright point. Individually and collectively, employees continue to bring recognition to SRNL. Two of our inventions were recognized by the Federal Lab Consortium as being among the World's Best Technologies. Elmer Wilhite, Ned Bibler, Mike Poirier, Jack Corey, Brian Looney, Michael Bronikowski and Bob Pierce represented the entire laboratory when they earned prestigious awards: the Don Orth Award to Elmer, the CNTA Distinguished Scientist Award to Ned, honors from AIChE for Mike, two awards from the Soil Science Society of America for Jack, the American Chemical Society's Southeast Regional Innovation Award for Brian, and the DOE Pollution Prevention Award for Environmental Leadership to Michael and Bob.

Our reputation for excellent work ranks high among the reasons that other institutions are interested in working with us, leading to Memoranda Of Understanding signed this year with Oak Ridge National Laboratory, Medical College of Georgia, South Carolina State University, University of South Carolina, and the expansion of work with the FBI and homeland security-related agencies. That same reputation for excellence will help attract organizations to work with us in the new Center for Hydrogen Research, which broke ground this summer, another significant milestone. We also have had numerous new customers visit our facilities and become aware of the great potential of this Laboratory.

Our commitment to safety, security and quality — three of the hallmarks of SRNL — continued unabated. For us, the safe, secure performance of excellent work is standard operating procedure, and that standard is noticed by our customers. We are leaders in safety, security and quality ... a testament to employees' dedication, value for each other, and responsibility for the very important work we are asked to perform.

The other measure of our year, however, is our customers' success. We have spent the year putting science to work to help customers overcome serious technical challenges, meet their objectives, improve their operations, and achieve new goals. On site, our work was vital to the site's success. Just a few examples of the way we made it possible for the site to meet its goals include support of Tritium and DWPF operations, work on the 9975 SARP, and development of a new approach to groundwater cleanup at the F Seepage Basin. Our support for these programs and others, including the TRU waste program, the D&D program and other site work, is setting the stage for the site's continuing success.

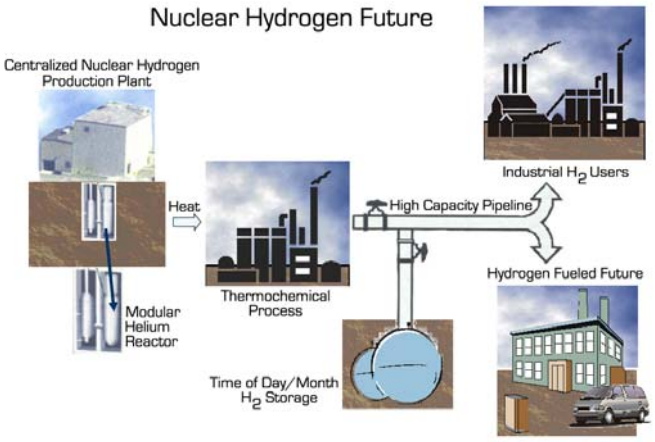
Offsite, we continued our support for our long-standing customers like the Hanford River Protection Project, the Ohio Closure Sites and Pantex, enabling them to meet key project milestones. This work was joined by work for new customers in the energy and homeland security arenas, expanding the number of ways that we put science to work for the nation.

Our outlook for 2005 shows the year bringing new challenges and rewards. Several initiatives we have worked so hard to realize will soon begin to take shape. Our employees have shown again that the people of SRNL have the skills and the dedication to continue making this laboratory a valued contributor to the nation … the reason we became a National Laboratory this year.

From top, award winners: Elmer Wilhite (left) with SRNL Director Dr. Todd Wright; Dr. Ned Bibler (right) with Deputy Director Dr. Paul Deason; Jack Corey (left) with Soil Science of America President Thomas Sims; Dr. Brian Looney

ENERGY SECURITY

DOE Funds Research by SRNL, Clemson and Others



A collaborative project among SRNL, Clemson University, the University of Virginia, and Aspen Technology, Inc., has been selected for funding by the U.S. Department of Energy. "The Sulfur-Iodine Cycle: Process Analysis and Design Using Comprehensive Phase Equilibrium Measurements and Modeling," which will research one aspect of the production of hydrogen from nuclear power, was named to receive one of 35 research awards (selected in a rigorous peer-review of 160 proposals) to U.S. universities. Together, the 35 research awards total $21 million over three years to engage students and professors in the Department's major nuclear energy research and development programs, including the Nuclear Hydrogen Initiative.

The concept of producing hydrogen using heat from a nuclear reactor holds considerable promise as a key element in supplying hydrogen for future energy needs. Nuclear production of hydrogen calls for a thermochemical cycle that uses the reactor's heat to split water into hydrogen and oxygen. Of the more than 100 thermochemical hydrogen cycles that have been proposed, the Sulfur-Iodine (SI) cycle is the primary target of international interest for the centralized production of hydrogen from nuclear power. This project addresses a critical engineering problem that needs to solved before a realistic assessment of the viability of producing hydrogen using the Sulfur-Iodine process can be made. If the Sulfur-Iodine process can be made to work efficiently enough, it holds the promise of a future in which hydrogen could be made in large quantities from nuclear, geothermal, or solar energy.

Work will be focused in three areas: Thermodynamic Measurements, Physical Properties Modeling, and Process Modeling. In a unique, integrated approach that allows for highly efficient exploration and feedback between the three focus areas, initial properties and process modeling development will be used to guide the selection of conditions for experimental measurement. Then, as measurements become available, property models will be refined and provided for the process modeling effort. Finally, updated process modeling results will be used to identify additional experiments most critical for minimizing remaining process uncertainties.

SRNL's role, led by Dr. Max Gorensek of SRNL's Engineering Modeling & Simulation group, will be to carry out the process modeling and optimization. Prof. Mark Thies of Clemson's Chemical Engineering Department will be responsible for the experimental work and has the overall project lead.

The end result of this project will be an optimized process flowsheet for the centralized production of hydrogen from nuclear power using the Sulfur-Iodine cycle that is based on sound experimental data and rigorous engineering models. This will enable an objective evaluation of the economic feasibility of producing hydrogen for the Hydrogen Economy in this manner.

Hydrogen Project Uses Two Areas of SRNL Expertise

Making use of two of the laboratory's areas of expertise, the Savannah River National Laboratory is part of a team studying the production of hydrogen using algae that produce the gas when exposed to sunlight. The team, led by Advanced BioNutrition Corporation, was recently awarded over $4 million from the U.S. Department of Energy for this three-year research project.

The research makes use of SRNL's expertise in both hydrogen and biotechnology. SRNL's effort is led by Dr. Ragaiy Zidan of the Hydrogen Technology Section (HTS), along with Gerald Hooker of HTS and members of the SRNL Environmental Biotechnology Section.

Over the years, other researchers have investigated the use of algae for the production of hydrogen, but their techniques required enclosed vessels called photobioreactors, which proved too costly to be practical. This team's approach removes that obstacle by eliminating the need for the photobioreactors.

Together, this team will develop, demonstrate and integrate the components of this process for producing 50,000 kg/day of hydrogen. SRNL's role is to conduct the engineering, economic and energy analysis, working with Clemson University and other team members to arrive at realistic economic projections. This task will begin with the development of a flowsheet containing all key steps in the process, based on input of the participants and other published reports. SRNL will develop conceptual design estimates of the capital and operating costs for scaled up facility and conduct the economic evaluation of the process, evaluating the market niches and other conditions necessary for the process's economic competitiveness.

In addition to Advanced BioNutrition and Clemson, other team members include Brooklyn College of the City University of New York, SeaAg Inc. and the University of Hawaii. Their roles include the study of various strains of algae and their properties, and the development of a prototype system.

Hydrogen Pipeline R&D Project

SRNL's Materials Technology Section is the lead and co-lead on two projects for hydrogen pipeline research as part of the hydrogen technology development for the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy. "Natural Gas Pipelines for Hydrogen Use" (led by SRNL's Thad Adams) involves a materials evaluation of service-experienced natural gas piping for potential use as hydrogen transmission and distribution piping, and "Hydrogen Permeability and Integrity of Hydrogen Transfer Pipelines" (co-led by SRNL's Paul Korinko) involves a comprehensive investigation of high and low pressure hydrogen permeation characterization of pipeline steels. These two are among seven DOE Hydrogen Pipeline Projects funded in FY05. In addition to SRNL, participants in the DOE pipeline projects include ORNL, the University of Illinois, and various industry and commercial hydrogen and gas supply partners.

NATIONAL SECURITY

NNSA Planning Meeting for Homeland Security

SRNL hosted a National Nuclear Security Administration (NNSA) planning meeting in December. The meeting brought together over 20 participants from NNSA Headquarters and the DOE national laboratories providing support to the Department of Homeland Security (DHS) to evaluate FY04 support activities to DHS and discuss future support activities. The participants toured SRNL's Environmental Biotechnology laboratories in the Aiken County Technology Laboratory.

Solid Freeform Fabrication Meeting

SRNL hosted a meeting of the Solid Freeform Fabrication (SFF) Inter-agency Manufacturing Operations Group (IMOG) in December. The meeting was attended by personnel involved with rapid prototyping and flexible manufacturing from SRS and other sites in the nuclear weapons complex including the national laboratories. Also in attendance were personnel from Clemson Environmental Technologies Laboratory, Clemson Research in Engineering Design and Optimization Laboratory and Optomec, Inc. The SFF-IMOG was established to exchange information, views, and ideas on rapid prototype technology and other computer-based systems involved in the engineering, design and manufacturing of weapon and non-weapon components and assemblies.

Rapid fabrication allows the fabrication of low-cost plastic prototypes and parts to verify form, fit and function, as in this prototype of a remote duct inspector

Installation of EDM for Tritiated Materials Testing

SRNL is installing Electrical Discharge Machining (EDM) equipment to permit sectioning of tritium-exposed components for materials testing. This equipment will provide SRNL with a unique-in-the-Complex method of evaluating the long-term effects of tritium on the structural properties of components. The EDM will allow SRNL to cut tensile and fracture toughness samples from the inside walls of returned reservoirs without changing the properties of those samples. This will permit SRNL personnel to obtain stress-strain property data from tritium-exposed reservoirs that are representative of the true state of the reservoir material in the field. These data will be used with numerical computational techniques to enhance SRNL's ability to predict reservoir aging and performance.

The location for the new equipment has been prepared, the machine components set in place and power supplied. Work can now begin with radiologically clean components to develop techniques and procedures, while the ventilation system design and installation are completed prior to work with tritium-exposed components.

ENVIRONMENTAL MANAGEMENT

Disposition of Liquids in TRU Drums

At the request of SRS Solid Waste (SW) department, SRNL is beginning preparation for dispositioning liquids removed from transuranic (TRU) waste drums. For shipment to Waste Isolation Pilot Plant (WIPP), TRU waste drums cannot contain more than 1 inch of liquid in the drum or in a container in the drum. Some of SRS's drums include containers (from vial up to 5 gallon size) with liquids, which must be removed prior to shipping. SW plans to remove the containers, but asked SRNL for methods to disposition the liquid in the containers. SRNL's recommended solution includes refurbishing three SRNL gloveboxes, receiving the assayed containers with liquids, conducting raman spectrometry to determine if the liquids are aqueous or organic, opening the containers in a glovebox, solidifying the liquid (much less expensive than characterizing the liquid and disposing down a drain), bagging the material, and sending back to SW via TRU drums to be disposed at WIPP. Agreement from S.C. Department of Health and Environmental Control will be pursued before beginning the work.

Transuranic waste drums

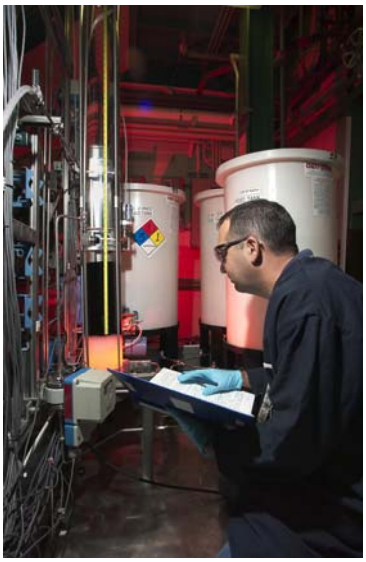
Milestone Reached in Support for Hanford River Protection

With the vitrification of three Hanford nuclear waste tank samples, SRNL has completed the largest segment of its largest work for others program. Since 1996, SRNL has been supporting the Hanford River Protection Program (RPP), helping to design, develop and test processes for treating Hanford's tank wastes and closing their tanks. This work provided approximately $100M in funding to SRNL made use of the same skills and expertise that made the design, startup and operation of SRS' Defense Waste Processing Facility (DWPF) possible. Hanford will treat their waste using a vitrification plant that is similar, but not identical, to the DWPF; their Waste Treatment Plant is expected to be operational in 2011.

In December, SRNL completed small-scale vitrification of the last of three Hanford tank samples — the final research and testing step in the major portion of SRNL radioactive work on behalf of RPP. This support has involved initial tank waste characterization and subsequent demonstration of various pretreatment steps. Two Low Activity Waste glasses were completed in early 2004 using a customized furnace with contact handling of the pretreated waste and product glass, inside of a radiochemical hood. The High Level Waste glass was vitrified in December 2004 using a customized furnace and remote sample handling in the SRNL Shielded Cells Facility. SRNL product testing on these immobilized Hanford tank waste glasses will be used by Hanford personnel to support qualification of the waste forms and provide information to support environmental permitting and the authorization basis.

Since the start of the SRNL Hanford research efforts, SRNL has safely and successfully treated over 30 liters of Hanford waste samples and vitrified 11 different Hanford waste streams into borosilicate glass.

Although the largest task is now complete, SRNL is continuing to support RPP with projects such as R&D testing of the Backup Cs Ion Exchange removal resin, analytical method development work, and support for computer modeling.



SRNL conducted chemical testing of the Resin for Cesium Removal for the Hanford River Protection Program

Monitored Natural Attenuation/Enhanced Attenuation

SRNL is coordinating a project for DOE that looks at nature's own ability to clean chlorinated solvents from the groundwater, and how to apply new science to help understand that process. Results of this three-year project are expected to accelerate cleanup by a minimum of 10 years for DOE sites that have groundwater plumes contaminated with chlorinated solvents. At SRS, the project is expected to make it possible to accelerate chlorinated solvent cleanup by at least 20 years.

In 2003, DOE launched the Monitored Natural Attenuation (MNA)/Enhanced Attenuation (EA) Project to facilitate the implementation of appropriate natural and enhanced strategies for the cleanup of solvent-contaminated groundwater at DOE sites. A technical working group of nationally recognized scientists, coordinated by SRNL's Dr. Brian Looney, is guiding the project's scientific and technical direction, working with researchers across the United States. SRNL's Karen Vangelas is the technical coordinator for SRNL. The product of the project will be a technical guidance document that is suitable for use across the DOE complex in evaluating MNA and EA as potential tools in remediating solvent-contaminated groundwater sites.

The technical working group identified several key concepts and technical areas to be explored and developed. They then sought out research projects that would help them meet their goals, selecting 14 research projects to be performed. Field test sites at the Savannah River Site were identified for those projects that required such a site. All of the research projects are now under way and are to be completed within 22 months.

More information about this project is available in the Natural Attenuation Monitor, available online at http://www.srs.gov/general/pubs/nam.pdf

SRNL researcher Maggie Millings presents test apparatus for calibration studies to be conducted before field testing begins.

Frit Development for Sludge Batch 4

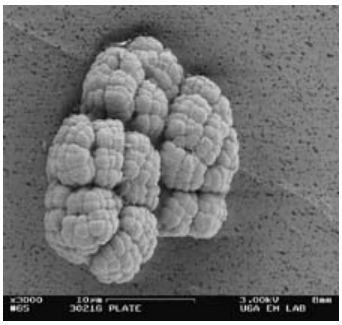
SRNL is supporting the SRS Defense Waste Processing Facility (DWPF) as it prepares for the next batch of sludge receipt and for the receipt of the initial salt streams. "Sludge" is the insoluble solids portion of the high-level radioactive waste, and "salt" is the soluble portion of the high-level radioactive waste; both are being converted into a stable glass form in the DWPF.

SRNL will recommend to DWPF operating parameters and frit (glass-forming materials) composition to maximize production rate and minimize the number of canisters of glass to be produced. In addition, SRNL will also assist with any evaluations necessary to ensure that DWPF is operating within its safety basis. This will be accomplished through flowsheet demonstrations, frit formulation evaluations, melt rate testing, and characterization and qualification of the actual radioactive sludge.

SRNL's Immobilization Technology Section (ITS) has begun investigation into flowsheet processing options for these waste streams. Together with the Statistical Consulting Section, ITS has also begun investigation into the performance of a set of candidate frits, using the models of DWPF's Product Composition Control System to predict glass product quality and glass process properties for each of the options.

SRNL in *DOE Pulse*

The Jan. 17 issue of *DOE Pulse* includes a feature story about SRNL's work with radiation-resistant bacteria. This work was also the subject of a front-page article in the *Wall Street Journal* on Nov. 16. *DOE Pulse* is published every other week to highlight the activities of DOE's national laboratories. Read it online at: www.ornl.gov/info/news/pulse



Kineococcus radiotolerans, the radiation-resistant microorganism discovered by SRNL Environmental Biotechnology Group.

PEOPLE NEWS

President's Awards Winners FY04 4th Quarter

Several SRNL employees received Westinghouse Savannah River Company President's Awards for Fourth Quarter 2004.

Melter Improvement Initiative:
Denny Bickford and Hector Guerrero

Along with other team members from the Closure and Field Support Services Business Units

SRS' Defense Waste Processing Facility has been challenged to meet and possibly exceed maximum predicted canister production for the contract period, and maximizing melter performance is a major factor. Three related innovations have resulted in a significant improvement in melter performance and output.

- Melter Heated Pour Spout Liner, which reduced the frequency at which work had to stop to clean out the neck, or bellows, of the melter.
- Melter Glass Pump, which increased melter production by 6 percent.
- DWPF Melter Siphon Detector, which allows DWPF to detect and take automatic action to stop melter siphon events, substantially decreasing the risk of overfilling a canister.

HB-Line Np Oxide Campaign:
Robert Lascola

Along with other team members from the Operations and Closure Business Units

The team prepared the F Area and HB-Line labs for the Np Oxide campaign ahead of schedule. This included implementation of new instrumentation and methods, testing and validation of several other methods, coordination and interface between many groups. The preparation was so thorough that WSRC and DOE Readiness Assessments resulted in only OFIs (Opportunities For Improvement).

Technical and Programmatic Leadership for the Recovery of TCAP Units:
Mark Dupont, William David Jacobs and John Scogin

Along with other team members from Operations and Projects, Design & Construction Business Units

The TCAP Recovery team was nominated for exceptional dedication in resolving the complex technical issues related to the performance, recovery, and installation of Thermal Cycling Absorption Process (TCAP) units as part of the SRS Tritium Facilities Modernization and Consolidation Project. Because of their dedication to the success of the project, the units have been accepted for service.

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President's Awards Winners FY04 4th Quarter, cont'd

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Development of Optimized Sorbent Material: David Hobbs

David conceived a change in chemical synthesis for monosodium titanate that has significantly improved the removal capacity of MST. Monosodium titanate will be used by the Salt Waste Processing Facility and the Actinide Removal Process for removing selected soluble actinides and strontium from high level waste. The improved material demonstrates more than a 10X increase in capacity for plutonium and neptunium. The material also sorbs the actinides and strontium much faster. As a result of these improvements, waste treatment can occur on shorter cycle times with less total reagent. Prior to this discovery, monosodium titanate was already demonstrated as the best available sorbent material for this application. The new material further opens the potential to use the sorbent for other metals in commercial and medical applications.

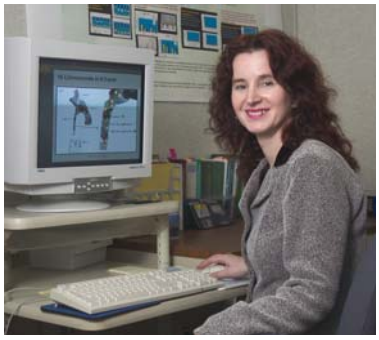
Dr. Papouchado Retires

After 34 years of excellent service, Dr. Lou Papouchado has elected to retire. He will leave a void for SRNL that simply cannot be filled. We thank him for his leadership, dedication, and distinguished service and wish him the very best. He will be missed by all of us who have depended on him and his leadership.

Dr. Papouchado started work in 1970 as a Research Chemist with DuPont at the Experimental Station in Wilmington, Delaware, and came to the Savannah River Plant in 1977 as the Assistant Chief Supervisor of the Laboratories. He has held numerous positions of increasing responsibility at the Site through his career, including the Manager of the Waste Treatment Technology Department.

Dr. Knox Appointed to Editorial Board

Anna Knox of SRNL's Environmental Analysis Group was invited to become a member of the Editorial Board of the International Society of Environmental Forensics' (ISEF's) journal. The two-year appointment began Jan. 1.



Dr. Anna Knox

Publications and Presentations

Presentation: Reversible Borohydrides for Hydrogen Storage

Ming Au of SRNL's Hydrogen Technology Section made a presentation on "Reversible Borohydrides for Hydrogen Storage" at the symposium on "Materials for Hydrogen Storage" held as part of the 2004 Materials Research Society Fall Meeting in Boston, Nov. 29- Dec. 3. His presentation, which reported SRNL's recent progress in development of reversible borohydride materials, drew a great deal of interest from the audience. A full paper will be composed for publication once the patent application is awarded. This two-year borohydride research project was funded by NNSA as part of the 2003 Plant Directed R&D (PDRD) program.

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Publications and Presentations, cont'd

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Presentation: MNA/EA Project

Karen Vangelas and Brian Looney of SRNL and Karen Adams (DOE-SR), presented the 2004 annual update of the Monitored Natural Attenuation(MNA)/ Enhanced Attenuation (EA) for Chlorinated Solvents Technology Alternative Project for the Environmental Protection Agency (EPA), Region IV, Federal Facilities Branch. Close communications with regulators is a key aspect of this project, which will produce a technical guidance document that is suitable for use across the DOE complex in evaluating MNA and EA as potential tools in remediating solvent-contaminated groundwater sites. Annual updates to the S. C. Department of Health and Environmental Control and the SRS Citizen's Advisory Board were held in September and November, respectively.

Special Edition of *Environmental Geosciences*

The first special publication issue in the American Association of Petroleum Geologists *Environmental Geosciences* journal has been published. The theme of the special publication is "Savannah River Site, The History, Geology, and Remediation." There are five papers in the first issue covering the following topics:

- "Overview of the History and Geology of the Savannah River Site" by Douglas E. Wyatt, EG&G Technical Services and Mary K. Harris, SRNL, covers the historic and present role of the SRS and provides a basic understanding of southeastern upper Atlantic Coastal Plain geology.
- "Geology and Environmental Remediation — Savannah River Site, South Carolina" by Mary K. Harris, Brian B. Looney, and Dennis G. Jackson, SRNL, discusses multidisciplinary approaches to environmental remediation at SRS.
- "Three-dimensional Geologic Model of Southeastern Tertiary Coastal Plain Sediments, Savannah River Site, SC: An Applied Geostatistical Approach for Environmental Applications" by Guillaume A. Jean - Imperial College, London; Jeffrey M. Yarus, Quantitative Geosciences LLP; Gregory P. Flach, Maggie R. Millings, Mary K. Harris, SRNL; Richard L. Chambers, Quantitative Geosciences LLP; and Frank H. Syms, BSRI, presents a state-of-the-art approach to groundwater and contaminant transport modeling that shares similarities with petroleum reservoir characterization.
- "Controlling Steam Flood Migration Using Air Injection Wells" by R.A. Hodges, Integrated Hydro Systems; R. Falta, Clemson University; L. Stewart, Praxis Environmental Technologies, Inc., demonstrates a unique approach to subsurface solvent remediation control.
- "Remediation of a Chlorinated Solvent-Contaminated Site using Steam Injection and Extraction" by David Parkinson, Norm Brown, Everett Sorensen, Integrated Water Resources, Inc., Charlie Eischen, EWC, Inc.; James Kupar and Thomas Kmetz, BSRI, presents steam techniques for solvent remediation in coastal plain sediments.

Additional topics will be covered in the next two special issues in March and July.

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Publications and Presentations, cont'd

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Book: *Coal and Coal Combustion By-products*

Anna Knox of SRNL's Environmental Analysis Group is one of the authors of two chapters in a book titled *Coal and Coal Combustion By-products*, which will be published through Kluwer/Plenum Publishers, New York, USA. The chapters are:

Influence of Coal Combustion Flue Gas Desulfuratization Waste on Element Uptake by Maize (*Zea mays L.*) – A.S. Knox (SRNL), J.D. Knox Columbia County Board of Education), D.C. Adriano (SREL), and K S. Sajwan (Savannah State University)

Prediction of Coal Ash Leaching Behavior in Acid Mine Water: Comparison of Laboratory and Field Studies – P. F. Ziemkiewicz (West Virginia University) and A.S. Knox (SRNL)

Paper in *Ground Water*

Greg Flach of SRNL's Geo-Modeling Group is one of the authors of a technical paper published in *Ground Water*. The work was conducted under the Independent Research & Development program in collaboration with Clemson University. The full citation is as follows:

G.P. Flach, S.A. Crisman, and F.J. Molz III, 2004, Comparison of Single-Domain and Dual-Domain Subsurface Transport Models, *Ground Water*, vol. 42, no. 6, pp. 815-828.

Graniteville

(Continued from page 1)

conditions, the cloud can persist in the vicinity of the release; however, during the daytime, atmospheric turbulence and surface heating can quickly cause the gaseous chlorine to be moved with the wind.

The team completed and posted model results on a special controlled website by 8 a.m., so off-site authorities involved in the response could monitor the consequence assessment. ATG support for the local responders — posting plume model results and providing weather forecasts — continued Friday and through the weekend.

This group provided practical support in real time. This modeling they provided was detailed and fine-tuned to this area, and the team was able to help interpret the plume and give the decision makers the best technical advice available. Emergency management decision makers also needed the team's weather forecasts, as well. They needed to know the dispersion of clouds and chance of rain to determine the hazards caused by mixing chemicals and rain water runoff. ATG personnel worked tirelessly to not only provide the forecasts, but also to help interpret them. The interaction among the modelers (meteorologists) and the unseen emergency responders provided an important input for the crucial and timely decisions made to protect people downwind from the catastrophe.

In addition, the scientists were asked to calculate numerous "what if" scenarios. When emergency managers were considering physically moving the cars to allow crews to patch the ongoing release, ATG ran calculations to evaluate the impact if the move damaged the car that was not yet leaking, causing a new leak. The team explained that if the tanker ruptured at night, the impact on the community would be far greater and cover a much larger area than if it were to rupture in the daytime.

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